Chapter 4
Planning, Implementing, Evaluating, and Improving Quality

The concept of the "quality cycle" was made popular by W. E. Deming in the 1980s. The Office of Water has translated Deming's four components of: *plan, do, check, and act*, into:

- **Planning** projects with quality in mind,
- **Implementing** the project according to plan and making revisions when needed to address unforeseen problems or changes,
- **Evaluating** the quality of interim and final products against the planned goals, and
- **Incorporating lessons learned** into future activities.

Documentation is not considered a distinct phase in the Office of Water quality system. It is an ongoing requirement that you must perform throughout all phases of your project. Indeed, it is often argued that if you did not document your quality management activities, you did not perform them. Because documentation is so important, this plan includes a stand-alone chapter to guide Office of Water managers and staff in documenting their quality management activities (see Chapter 5).

Planning Quality in Office of Water Activities

Just as the three most important principles in real estate are location, location, location, the three most important principles in quality management are **planning, planning, planning!** Because quality must be built into a project at the start, not added later, a crucial requirement of the Office of Water's quality system is the use of up-front, systematic planning for all projects, particularly those that will rely on environmental data of one form or another. Although such projects vary greatly in scope and importance, each should be started in essentially the same way — by determining the relevance of the activity, the level of quality required, and by planning accordingly.

Nobody plans to fail, but many people fail to plan.

The planning steps outlined here are not absolutes, but are a suggested approach to planning that will enable you to plan effectively and meet the requirements of the Office of Water Quality system. Other steps can be taken, other questions asked. The point is that systematic planning is *essential* to managing quality and is carried out by a group with sufficient knowledge to ensure that the relevance of the project and activities undertaken will result in a product that will have the level of quality needed for its intended purpose.

Step 1 - Identify the Project Scope and Purpose

The planning process should begin by addressing the following basic questions:

- What is the primary purpose of the activity?
- How is the activity relevant to our organization's mission, and why is it important to proceed?
- Who is the "customer" for this activity (e.g., senior EPA management, the public, Congress, the regulated community, etc.)"
- What are the customer's requirements?
- Are environmental data required? If so, who are the "suppliers" of those data?
- What are the quality requirements for the activity?
- What is the schedule for completion and is it driven by forces outside of the Office of Water (e.g., legislative or judicial deadlines)?

While the questions need not be in this exact format, the issues behind the questions need to be addressed before proceeding with the activity. A common approach to answering these questions, and thus to planning, is to assemble a team or a work group of knowledgeable staff to work out the details. The project manager should assemble a team that includes members of the management, staff with firm technical grasp of the subject matter, be it environmental chemistry, economics, or statistics, to name just a few, as well as those persons who control the budget and those who manage any contractors or grantees involved in the effort. **It is also essential that the team or work group consult with or seek direction from a member with an assigned quality system role at an appropriate level within the organization, such as the Quality Assurance Coordinator for an activity in a branch, or a Quality Assurance Officer for an activity at the Program Office level.** If a team approach is not employed, it is even more important that a person within the quality system be consulted in the initial planning phase of the activity to ensure that quality system requirements are being addressed.

Step 2 - Identify Resource Requirements

The answers to the questions above outline the requirements for the activity, which must include the requirements for quality. Once the basic requirements are established, you have to answer additional questions that will drive the implementation phase of the project. These questions include:

- What activities must be performed?
- What staff members are needed to complete these activities? Are these staff available? If not, what other options exist (e.g., will staffing limitations dictate achievable project quality or project design?)
- What resources and materials are needed to complete project activities? Are these resources/materials available? If not, what other options exist (e.g., will resource limitations dictate achievable project quality or project design)?
- If data are required, what kind of data are needed, how will they be collected, and what are the quality requirements?
- Can we achieve these requirements within the schedule, using the available technical, financial, and staffing resources?

If you do not have suitable answers to these questions, then you may need to modify the design or scope of the activity to ensure that the product will meet the quality requirements on schedule and with the available resources.

Step 3 - Identify Performance Measures

The third step is to identify how you will recognize if you have been successful. As in:

- How can we measure the success of the project (e.g., through quantitative measures, surveys, peer review, etc.)?

The measure of success is an important aspect of the assessment and corrective action phases of the project, which are discussed at the end of this chapter.

Planning Tools

The Office of Water approves the use of a variety of planning tools that can help you manage the quality of your activities. These tools include quality and peer reviews, the use of simple software tools that may be used to identify project milestones and resources, and a formal multi-step process used to derive qualitative and quantitative statements concerning data quality objectives for the project. Possible planning tools are described below. This list is not exhaustive, and Office of Water staff are free to use

any other tools that may facilitate their planning processes. The selection of appropriate planning tools should be done on a case-by-case basis using the graded approach described in this quality management plan. In accordance with the Office of Water's bottom-up philosophy concerning implementation of the quality system, the selection of appropriate planning tools should be made at the lowest possible level (i.e., the project or Branch level).

Quality Review: Also known as peer input or peer consultation, this type of planning review refers to the involvement of technically qualified peers during the development of an Agency work product and includes an open exchange of data, insights, and ideas. Depending on the project size and scope, it may be advisable to ensure that stakeholder concerns are represented in this review.

Note: In accordance with EPA's Peer Review Policy, peers or stakeholders who provide active, ongoing input and participation in the development of a work product are not eligible to undertake a formal peer review of that work product because they lack independence from its development.

Checklists: Certain projects may be small enough, routine enough, or straightforward enough that quality can be adequately planned through the use of standardized checklists developed at the Office, Division, Branch, or even Project level. For example, the EPA Quality Staff recently published draft guidance on using data from other sources, e.g., secondary uses of data. This draft document dated May 25, 2001, and entitled *Using Data from Other Sources — A Checklist for Quality Concerns* is available on the Quality Staff web site (www.epa.gov/quality). The Office of Water encourages each program office to consider the development and use of checklists to facilitate efficient planning and documentation of such projects.

Project Scheduling Software: Commercially-available software designed to identify project milestones including interim deadlines, identify resources needed to complete the project, and identify scheduling conflicts. These tools typically allow projects to be either forward-scheduled (i.e., planned forward from a specific project start date) or reverse-scheduled (i.e., planned backwards from the scheduled project due date).

Data Quality Objective Process: A formal, multi-step process described in EPA's *Guidance for the Data Quality Objective Process (G-4), August 2000, EPA/600/R-96/05* as a systematic planning tool for environmental data collection. The process was originally developed around primary data collection activities and while it may be applicable to establishing objectives for secondary uses of data, it retains a focus on primary data collection. Therefore, although it is not required, **the Office of Water highly recommends that it be employed where practical.**

Formal Peer Review: EPA has a formal Peer Review Policy, described in the EPA Peer Review Handbook. In accordance with this policy, **the Office of Water requires that Peer Review be incorporated into the planning process for *all major, scientific or technical work products*.** This documented, critical review is an in-depth assessment of the assumptions, calculations, extrapolations, alternate interpretations, methodology, acceptance criteria and conclusions pertaining to the major scientific or technical work product and of the documentation that supports this product. The determination that a scientific or technical product is "major" is based on whether it meets at least one of the following criteria:

- Does it support major regulatory decisions or policy/guidance of major effect?
- Does it establish a significant precedent, model or methodology?
- Does it address controversial issues?
- Does it focus on significant emerging issues?
- Does it have significant cross-Agency/inter-Agency implications?
- Does it involve a significant investment of Agency resources?
- Does it consider an innovative approach for a previously defined problem/process/methodology?

- Does it satisfy a statutory or other legal mandate for peer review?

If your project meets one or more of the above criteria, you must consult the Peer Review Handbook to determine if the formal peer review process is required and to identify appropriate planning measures that need to be taken to ensure that project schedules and resources are adequate to allow for this review.

Whatever planning tools are employed, they must be used in a systematic fashion. A graded approach to planning ensures that the level of detail addressed in the planning phase is commensurate with the importance of the work, its intended use, the available resources, and the schedule.

Implementing Quality Management Activities

As described in Chapter 3, all Office of Water staff and managers are responsible for implementing this quality management plan. The Assistant Administrator, Office Directors, Division Directors, and Branch Chiefs do so by committing the staff, training, and other resources necessary to successfully implement the quality management at the project level. The Quality Assurance Manager, Quality Assurance Officers, and Quality Assurance Coordinators implement this plan by:

- Assisting project managers and staff with incorporating quality management into their daily activities,
- Monitoring program activities to ensure that the quality system is being implemented as planned, and
- Reporting the status of quality management activities to senior management and EPA Quality Staff

Implementation of quality management activities at the project level depends on the specific activities involved in the project. As a result, it is not practical to suggest a cook book approach that will cover all projects. However, the staff participating in a project can start to implement the quality system by meeting the following generic requirements:

- Make sure you are aware of and familiar with any approved quality assurance project plans or other documents governing the quality system to be used on the project. Project managers must provide this information to the technical staff. If the staff have not received such materials, then they need to ask the project manager if they exist.
- Identify your specific responsibilities listed within these materials. If such materials do not exist, identify specific steps you can take to ensure the quality of work you produce.
- Consult with the project manager and/or technical peers about changes in project scope or unanticipated problems that may not be adequately addressed by the existing quality system.
- Document problems that you encounter on your project, including any deviations from the quality assurance project plan or other quality system documentation, and the steps taken to resolve those problems. (Documentation requirements are described in greater detail in Chapter 5).

Evaluating the Results and Making Adjustments

The planning and implementation aspects of quality management are not performed simply to satisfy the requirements of the EPA quality order. Rather, they are the first steps in the quality management process. It is not possible to manage quality or learn from past mistakes without evaluating the results of a project in relation to the plan and taking any corrective actions that may be needed. Closing the quality cycle requires evaluating the success of the project and considering how the process can be improved.

There is a wide range of tools and processes available to evaluate the quality of these activities and their resulting work products. The Office of Water encourages the use of any processes or tools that

promote cost-effective quality assessments and recommends that these tools be selected at the project or Branch level.

The ultimate goal of any given evaluation is to determine which aspects of the quality system are working properly and which are not. However, the common perception of any of these evaluations is that they are designed simply to find problems. That perception can lead to an "us versus them" mentality that pits the evaluators against the staff performing the work and defeats much of the purpose of the quality system. Everyone in the Office of Water has a responsibility to make the quality system work effectively.

Several of the evaluation tools are the same as those used to plan quality management activities. For example, peer consultation and peer review are effective ways to obtain an independent assessment of the quality of data generated in the project, or of the final work product. Similarly, project managers can use project scheduling software to compare the original project schedules and resource estimates against the final schedules and resource utilizations. The point of the evaluation is not to cast blame for delays or other problems, but rather, to identify aspects of the project that posed problems and build on that knowledge when designing future projects.

Other tools are specifically designed to facilitate the evaluation phase of the quality system. These include data validation, data quality assessment, technical system reviews or audits, management system reviews, annual program reviews, and quality system audits. The evaluations described below, along with recommended corrective strategies, may be carried out internally, by staff from the Office of Water, by contractors under the direction of Office of Water staff , or by external parties, including the EPA Quality Staff.

Internal Peer Consultation

Consulting with one's peers is a useful and important form of evaluation. It is also one that many people practice already without giving it much thought. The process can range from an informal request for a coworker to "take a look at this for me" to a more formal review. Peer consultation may go by other names as well, including a "quality review" in some organizations. However, it should not be confused with the formal "peer review" process established at EPA.

This form of review can apply to both technical and non-technical products, including correspondence. Peers can provide needed editorial reviews, but they can also help identify other weaknesses in work products. The scope and value of the review will depend on the reviewer's knowledge of the subject matter and their own skills. Thus, if the goal is an editorial review, the reviewer should be a good writer or editor. If the goal is an evaluation of the technical merits, then the reviewer should have a firm grasp of the technical aspects of the material.

The Office of Water quality system encourages the use of peer consultation, but does not require it as a formal process. However, whenever a peer is consulted, the comments from that consultation should be maintained as a record of the consultation itself. This could be as simple as retaining a marked copy of the product containing the reviewers comments, along with the reviewer's name and the date of the consultation. Comments in an electronic form may serve the same purpose, provided that they can be traced to the reviewer and the date.

Responses to Peer Consultation: As noted earlier, peer consultation is a useful, but not necessarily formal, process. Therefore, no set responses are described here. However, common sense applies. Obviously, typographical errors must be addressed and editorial comments should be considered in revising the product. When major technical issues are identified, the reviewer and the developer or author of the product should work together to determine if the issues are symptoms of a systematic problem. Where needed, line management and the relevant quality system staff should be brought into the process.

Formal Peer Review

Peer review is a formal Agency process that uses technically qualified peers (persons of equal or greater skill to your own) to ensure independently the quality of all major, technical work products. It is an essential Agency requirement covering the review of technical products and the *scientific and technical* aspects of *major* products, and it is described earlier in this Chapter.

The Assistant Administrator is the ultimate decision maker and is accountable for implementing the Peer Review Policy within the Office of Water. The Assistant Administrator may designate Office directors and Division Directors or other appropriate level line-managers as the front line decision makers.

Responses to Formal Peer Review: By its very nature, the peer review process is a formal one. In general, every peer review comment must be formally addressed. Some comments may be addressed by incorporating them or making the suggested changes, other comments may be addressed by careful rebuttal, or by demonstrating that they are not relevant. The response to the peer review comments must be documented in accordance with the peer review policy.

Data Validation

As used in this quality management plan, data validation refers to an evaluation that is applied to primary data collected under EPA's direction. The goal of data validation is to ensure that individual results collected to support an EPA decision are valid in the context of the manner in which they were collected. For sampling and analysis activities, "valid" data can be traced from the collection of a given sample in the field, through the procedures employed by the laboratory performing the analysis, to a final report of the results. Validation also examines the issue of "completeness" of a data set by determining if results were produced for every sample that was collected, and if not, why not.

Data validation also involves a comparison of the sampling and analysis data against the acceptance or performance criteria for the data. The criteria may be the result of the data quality objectives process, but often are derived from the performance specifications of the sampling and analysis methods employed for the specific project. For example, data validation may involve the examination of the quality control data for various types of blanks, calibrations, and spiked sample analyses that are called for in many EPA analytical methods, relative to the performance specifications in those methods. Validation also may involve the comparison of the actual sample collection procedures with the sampling design described in the planning documentation to determine the likelihood that the materials collected accurately represent the source. The results of these evaluations may include a determination that the data meet the criteria, that they do not meet the criteria because of poor performance by the samplers or the laboratory, or that they do not meet the criteria because of problems inherent in the samples themselves.

Within the Office of Water, data validation activities are most likely to be employed for field sampling and analysis projects, such as effluent guideline development studies. Because these activities involve standardized methods for sampling and analysis, data validation is generally performed in accordance with a standard operating procedure that is specific to the analytical methodology.

Responses to Data Validation: Data validation typically identifies two distinct types of problems - those associated with poor laboratory performance, and those associated with factors outside of the laboratory's control, including problems related to the sample matrix itself or problems related to the sample collection and shipping processes. Whatever the source of the problem, the goal of data validation is to obtain data that meet the quality required for the specific project and to identify when that goal has not been met.

When the results of data validation efforts identify problems with laboratory performance, several forms of corrective action may apply. For example, the laboratory may be required to reanalyze individual samples associated with the performance problems at no additional cost to EPA. For problems that indicate a more pervasive failure of the laboratory's quality system, it may be appropriate to negotiate a more systematic solution to the problem, including changes in the laboratory's internal quality system. In extreme cases, it may be necessary to take formal contract action against the laboratory. In this latter instance, the response may not change the quality of the data already generated for the specific samples or the project, rather, it may prevent future data quality problems.

In contrast, the validation process may identify problems that are outside of the control of the laboratory, including when the requested methods apply to the samples less than ideally, or problems associated with the collection or shipment of the samples themselves. In these instances, it is critical that EPA and the laboratory work together to determine the source of the problems so that EPA can take corrective actions. In some cases, part of the corrective action is to ensure that the data users understand the limitations of the quality of the data that were produced, so that they can adjust their use of the data or their conclusions about their meaning. Other cases may also involve corrective actions by the party collecting and shipping the samples.

Data Verification

As noted in Chapter 2, the Office of Water may make secondary use of data from other sources in making environmental decisions. The data may take a variety of forms, ranging from primary data generated by others with all the commensurate supporting information, to data compiled from literature sources, to the results of modeling efforts, or even to data drawn from anecdotal sources. Whatever the original source of the data, the Office of Water requires that reasonable efforts be made to verify the data and to assess their quality to the greatest extent possible.

In the context of this plan, data verification refers to all efforts to determine if the data are properly represented. This may include going back to the original published source of the information, rather than relying on a summary or a citation in a review article. It may involve contacting the person who provided the data and confirming the specific manner in which they were generated. If the data are the result of a modeling effort, then the model should be examined to ensure that the results were generated as intended. If the data involve calculations of descriptive statistics and the original data are available, then the calculations may be spot-checked for accuracy. Where the data are primary data from some other source, it may be possible to perform data validation procedures such as those described above. If the Office of Water did not control the generation of those data, then it may not be possible to effect any corrective actions to improve the quality of the results. **Nevertheless, it is critical that the quality of the data be known to the greatest extent possible and that any limitations to the use of the data be identified and documented.**

Data Quality Assessment

A data quality assessment is a formal scientific and statistical evaluation to determine if the data obtained from an environmental data operation are of the right type, quality, and quantity to support their intended use. The need to conduct a data quality assessment is a project-specific decision and will be specified in project-level quality system documents such as a quality assurance project plan.

The most current version of *Guidance for Data Quality Assessment: Practical Methods for Data Analysis*, EPA QA/G-9, may be used to assist in the data quality assessment process. Data quality assessments are the responsibility of the project managers and the level of effort for the data quality assessment should be commensurate with the project objectives and intended use of the data.

Data quality assessments often are conducted during and/or at the end of the data collection activity. They may be performed during the project if the project manager has identified concerns about data quality. The project manager, with assistance from the quality assurance officer is responsible for determining the need for a data quality assessment. The process provides the necessary steps for the statistical analysis of data to determine whether or not the data meet the objectives of the project and with what level of confidence these data may be used. The result of a data quality assessment is a quantitative statement of the limitations on the quality and potential uses of the data. If deficiencies are found, potential technical and managerial causes are examined, and follow-up measures identified.

The results of the data quality assessment will be documented and provided to the Project Manager. The Project Manager is responsible for reviewing the results, determining any corrective actions that are needed, and confirming the implementation and effectiveness of those corrective actions.

Responses to Data Quality Assessments: Data quality assessments conducted during the project afford an opportunity for ongoing corrective action. Data quality assessments conducted at the end of a project provide a means of verifying the utility of the data, the need for a new project effort, or determination of the feasibility of a long-term program.

The response to a data quality assessment may be to revise the systematic planning process for future activities to avoid the data quality problems that were identified in the current projects. The response for a specific project could include modifying the decision to match the quality of the data, or to collect more data.

Technical System Reviews or Audits

A technical systems review or audit is also known as a field and laboratory audit. It focuses on the actual environmental measurement data collection systems, documentation, and the quality control data associated with those systems.

A technical systems audit is a thorough, systematic, qualitative audit of facilities, equipment, personnel, training, procedures, record keeping, data validation, data management, and reporting aspects of field and laboratory activities. A technical systems audit often entails a site visit and an examination of sampling and measurement procedures, personnel training, general laboratory cleanliness, support systems, equipment and facilities, calibration, maintenance, and repair records, control charts, etc. However, other approaches may be employed, including the use of performance evaluation samples relevant to the project.

Given the costs associated with technical systems audits, it is not practical to conduct them for every data collection project. Moreover, since much of the sampling and analysis performed for the Office of Water is conducted by a small number of contractors with multi-year contracts and operating across a variety of projects, it may be more practical to rely on the results of routine pre-award and post-award audits of these contractors then to conduct project-specific reviews for every project. The frequency of such audits should be based on the schedule for the project and the length of the contract.

Thus, under the graded approach, technical systems audits may be reserved for specific projects, based on the importance of the project, the risk of a decision error, the schedule for completion, and the available resources. The need for a technical system audit should be established and documented during the initial planning phase of the project.

The most current version of the document *Guidance on Technical Audits and Related Assessments,* EPA QA/G-7, may be used to plan and conduct an audit, with modifications appropriate for the types of data that are being collected. Technical systems audits may be facilitated by the use of

checklists geared to the types of activities and analyses involved in the project. However, the auditors must be competent scientists who are familiar with the particular data collection technology and procedures. Therefore, the auditors will be selected on the basis of their demonstrated skills. Audits of field operations may require staff with different background and expertise than those who conduct laboratory audits. Where there are project-specific concerns or anticipated problems, the project manager must provide that information to the auditors.

Audits will be scheduled and tracked by the Quality Assurance Officer in consultation with the project manager. The roles, responsibilities, and independence of the evaluation personnel, the process for reviewing, reporting and responding to corrective actions, and the process for ensuring the implementation and effectiveness of corrective actions can vary among projects. Therefore, these details will be defined in a plan specific for each audit. The results of technical systems audit are provided to the appropriate line and program supervisors.

Responses to Technical Systems Audits: The results of a technical systems audit may point to pervasive problems that go beyond the results for a small number of the samples. As a result, the responses need to be on a similar scale. If a pre-award audit finds significant problems, then the EPA project manager must choose an appropriate response that is based on the project schedule. This could include finding another contractor, improving communications between EPA and the contractor, or an intensive effort by EPA to work with the contractor to resolve the problems now in order to meet the project deadlines.

The responses to the findings of an audit conducted during the course of a project should be designed to maximize the quality and quantity of the data to be delivered to EPA.

Quality System Audits

Quality system audits were previously called management system reviews. The new term was adopted by the EPA Quality Staff in response to new protocols from the Government Accounting Office and the change was designed to clarify that it is a review of the quality management system, and not other types of management systems. Quality system audits evaluate a specific quality system associated with environmental data collection activities to either affirm the correctness and appropriateness of the quality system approach or to identify areas where additional attention would bring significant benefits. There are two types of quality system audits: internal and external. Internal quality system audits may be conducted at the level of a given Program Office, or as an internal review of the Office of Water quality system itself. External quality system audits may be conducted by EPA's Quality Staff to determine the compliance of Office of Water Programs with the quality management plan. EPA's Quality Staff web site provides resources and guidance to assist in Quality System Audits.

The Quality Assurance Manager, with assistance from the Quality Assurance Officers and senior Office of Water management, will select Office of Water programs for internal quality system audits. Given that this is a five-year quality management plan and there are five program offices, this equates to one program per year. The audit will be performed by Quality Assurance Officers from the other Program Offices within the Office of Water, with assistance from a technical team selected by the designated lead quality assurance officer and approved by senior Office of Water management. The Office of Water will initiate the internal quality system audit process one year after approval of the new quality management plan.

An audit of the Office of Water's quality system assesses the quality management structure, the quality management plan, and other office-wide quality system components, to determine whether Office of Water is implementing a satisfactory quality system. During the audit, the effectiveness of, and adherence to, the approved quality management plan, as well as the adequacy of resources and personnel provided to implement the quality system will be evaluated by the audit team.

The following issues are examined during both internal and external quality system audits:

- Adherence to the Office of Water quality management plan
- Procedures for developing data quality objectives and other acceptance criteria
- Procedures for developing and approving quality assurance project plans
- Quality of existing quality assurance project plan guidance and quality assurance project plans, e.g., is the guidance effective and do the plans meet the EPA requirements?
- Procedures for developing and approving standard operating procedures
- Procedures, criteria, and schedules for designing and conducting audits
- Tracking systems for ensuring that the quality system is operating and that corrective actions disclosed by audits have been taken
- Degree of management support
- Responsibilities and authorities of the various line managers and the quality assurance officer for carrying out the quality system
- The level of financial resources and personnel devoted to implementing the quality system
- Existence of appropriate quality system documentation and its conformance with the requirements of the quality management plan

The Office of Water Quality Assurance Manager will assist the audit team in determining the scope of the internal audit, planning, scheduling and implementing the audit. The findings are presented to the Assistant Administrator for Water and the Office of Water Office Directors. The results will appear in a findings report. Information on the results of the quality system audits will also be included in the Quality Assurance Annual Report and Work Plan.

The Office of Environmental Information Quality Staff implement independent quality system audits of the Office of Water quality system once every three years. Usually, the review team includes individuals from the Quality Staff, from other EPA Offices, or Regions who spend a week at the Office of Water meeting with management, interviewing staff, and performing file reviews. The audit results are reported to the Office through a draft findings report.

Responses to Internal and External Quality Systems Reviews: Senior management is responsible for determining necessary actions and developing a plan to address weaknesses disclosed in both internal and external quality system audits. For internal audits, milestones must be developed so that progress on corrective actions can be measured. Managers are responsible for ensuring compliance with the approved corrective actions. Progress is to be reported to the Administrator, Division and Office Directors, and the Federal Managers' Financial Integrity Act Coordinator. This will include identifying any problems in audits discussing corrective actions and summarizing follow-ups on the previous year's agenda. If major deficiencies are found, follow-up audits may be required and should be discussed with senior management. The Quality Assurance Annual Report and Work Plan will summarize the results of, and response to, any internal quality system audit conducted during the previous fiscal year.

For external quality system audits, the Office of Water must respond to the results of the audit and develop a corrective action plan to address any issues which require corrective action. The roles and responsibilities of auditors, experience and training for audit personnel, independence of audit personnel, and headquarters' management review of and response to findings for quality system audits are established by the Quality Staff and are beyond the scope of this quality management plan. The Quality Assurance Annual Report and Work Plan will summarize the results of, and response to, any quality system audit conducted by the Quality Staff during the previous fiscal year.

Annual Program Review

Each year, the Office of Water is required to submit a Quality Assurance Annual Report and

Work Plan that summarizes the quality management activities conducted during the preceding year in all parts of the Office of Water. It also reports on all reviews and audits conducted during the year, any actions taken in response to those reviews, and plans for activities in the coming year.

As part of the process of preparing the annual report, all programs involved in the collection of environmentally-related data will review their quality system documents to determine if they remain relevant to the mission of the program and if they ensure that data of known and sufficient quality are used to support programmatic decisions. Ensuring that this review occurs is the responsibility of Branch Chiefs and/or Division Directors responsible for implementing the program, with assistance from the respective Quality Assurance Coordinators and Quality Assurance Officers.

At least annually, Office of Water management will meet with the Quality Assurance Manager, Quality Assurance Officers, and Quality Assurance Coordinators to discuss adherence to the quality system and to identify areas where improvements can be made. Corrective actions will be developed to correct any major deficiencies and outlined in the annual report and work plan.

Dispute Resolution

Disputes involving evaluations are not uncommon. Such disputes will be addressed at the lowest level of management that is practical, as described in Chapter 3 of this quality management plan.

Quality Improvement

One goal of this quality system is to afford all Office of Water programs with opportunities to improve the quality of their products, including decisions based on environmental data.

Office of Water staff at all levels are accountable for continuous quality improvement. The process of continuous quality improvement leads to a better and more responsive quality system. The supervisors, project managers, and other technical staff have the most direct experience with the quality system process and are encouraged to identify opportunities for improving the quality system by contacting the Quality Assurance Manager directly or through discussion with their management or Quality Assurance Coordinator.

In an effort to encourage an open dialogue regarding quality system improvement, and to help staff perform their jobs, the team performing a quality system audit will often ask questions about the support received by personnel from the Quality Assurance Officers and Quality Assurance Coordinators. The Quality Assurance Manager will also periodically meet with the Quality Assurance Officers and Quality Assurance Coordinators to discuss and address quality issues.